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Climate change related statistics

Recommendations on climate change related statistics

Note prepared by the Task Force

Summary

The document is an extract from the draft recommendations on climate change related statistics. It provides the executive summary, introduction and main conclusions of each chapter of the draft recommendations. In addition, it includes the full chapter on recommendations on climate change related statistics.

The recommendations were developed by a Task Force on Climate Change Related Statistics chaired by Canada. The Bureau of the Conference of European Statisticians reviewed the full text of the recommendations in January 2014, supported the draft recommendations and decided to submit them to the 2014 plenary session of the Conference.

The full text of the recommendations has been sent to all members of the Conference for electronic consultation. Subject to positive outcome of the consultation, the recommendations will be submitted to the 2014 plenary session of the Conference of European Statisticians for endorsement.

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I. Executive summary

1. This report presents recommendations for improving the statistics related to climate change collected by national statistical systems and enhancing their utility for the compilation of greenhouse gas inventories. The recommendations were developed by the Task Force on Climate Change Statistics at the request of the heads of the national statistical offices of the member states of the United Nations Economic Commission for Europe and other countries that participate actively in the work of the Conference of European Statisticians. The Bureau of the Conference of European Statisticians established the Task Force in November 2011. The report primarily addresses data that are already collected as part of official statistics and that can support analysis or research related to climate change. The report also serves as a tool for discussion with producers of climate information outside the national statistical system. The report does not focus on scientific or meteorological data on changes in weather and climate.

2. In June 2012, the Rio+20 Conference on Sustainable Development emphasized climate change as an immediate and urgent global priority. This has increased the pressure to provide new information to support analysis of climate change and improve existing statistics. The Task Force organised two expert meetings to explore user needs and existing practices within national statistical systems and to review its draft recommendations.

3. In drafting its recommendations, the Task Force analysed the results of an earlier survey of the involvement of national statistical offices in climate change related statistics and carried out interviews of users of climate information, including the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change, research agencies, non-governmental organizations and universities.

4. The Task Force defined climate change related statistics as:

Environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to these consequences.

5. To narrow the focus of work for official statistics, the report presents recommendations in areas where the national statistical offices and other members of national statistical systems can contribute with concrete actions.

6. National governments in most developed countries have for many years published information on greenhouse gas emissions through a well-established reporting process guided by the United Nations Framework Convention on Climate Change. Statistical offices often provide source data for the inventories, whereas the compiler is usually outside the national statistical system. Official statistics on climate change are less well developed, though several statistical offices have started to work in this direction. Climate change related data are scattered across a variety of organisations and are largely unstructured. The wide range of existing official environmental, social and economic statistics could be much better utilized for climate change policy and analysis.

7. The report recommends that national statistical offices work more closely with greenhouse gas inventory producers to ensure that official statistics meet the needs of greenhouse gas inventories. Given the considerable amount of statistical data required for the inventories, it is recommended that national statistical offices be recognized as formal entities in the greenhouse gas inventory systems in all countries. This could be done simply by explicitly noting the role of the national statistical office in the inventory documentation submitted to the United Nations or via a Memorandum of Understanding between the national statistical office and the national entity responsible for the inventory. It would be

beneficial as well to create national working groups around greenhouse gas inventory compilation and other climate change related statistics.

8. It is recommended that national statistical offices start improving climate change related statistics gradually and based on their key competencies. First, existing environmental, social and economic statistics should be better organised for the purposes of climate change analysis; for example, official statistical dissemination channels could be better used to provide climate change researchers and decision makers with access to them. As a second step, the usefulness of the existing statistics for climate change analysis should be improved by reviewing existing data collection systems. In this context, the Task Force underlines the importance of linking existing datasets to improve their coherence and maximize their potential for climate change analysis. Third, development of new statistics may be considered; for example, on the underlying driving forces of climate change, on its social and economic impacts, on mitigation efforts and on vulnerability and adaptation.

9. National statistical offices should act as the facilitator for inventory compilers within the national statistical system; for example, by assessing the usefulness of existing official statistics for inventory compilers, by reviewing the statistical requirements related to the Kyoto protocol and other global or regional climate change agreements and by preparing themselves to meet new data requirements. International statistical organizations should also contribute by engaging in processes around international climate accords and the global greenhouse gas inventory system.

10. The Task Force realizes that taking action on the points above will challenge the infrastructure of national statistical systems. Reviews of standard classification systems, registers, definitions and survey methods will all be required to ensure the usefulness of official statistics for climate change analysis. So too will be finding new ways to ensure confidentiality of official statistics while providing climate change analysts with increased access to microdata.

11. Statistical systems will need to acquire new kinds of expertise through training, recruitment and, especially, through partnerships with other producers and experts. In the longer run, organizational changes may be required in national statistical offices to support the production of these statistics that cut across the statistical system.

12. The Task Force's recommendations are the first ever developed to help national statistical offices improve climate change related statistics and enhance their support to greenhouse gas inventories. While the recommendations represent useful first steps, further international work will be required to support their implementation. To this end, an international forum could be established to share good practices, improve collaboration, discuss priority data needs, discuss a key set of climate change related statistics and identify areas for further methodological work. The global nature of climate change calls for wider cooperation among users and producers of statistics to better respond to the growing information needs. Statistical standards and guidelines need to be agreed at the international level to ensure comparability and efficient use of resources. International statistical organizations (for example, the Conference of European Statisticians and its secretariat) should ensure cooperation with the United Nations Framework Convention on Climate Change, the International Panel on Climate Change, the World Meteorological Organisation and others.

II. Introduction

13. These recommendations aim at improving the statistics related to climate change collected by national statistical systems and enhancing their utility for the compilation of greenhouse gas emission (GHG) inventories. While this report is aimed primarily at official

statisticians, it also serves as a tool for discussions with those outside national statistical systems who are producers and users of climate change related statistics.

14. The recommendations were developed by the Task Force on Climate Change Statistics at the request of the heads of the national statistical offices of the member states of the United Nations Economic Commission for Europe (UNECE) and several other countries that participate actively in the work of the UNECE Conference of European Statisticians (CES). The Bureau of the Conference of European Statisticians established the Task Force in November 2011. The Task Force consisted of experts from the statistical offices of Canada (Chair), Finland, Italy, Mexico, Norway, Qatar and the United Kingdom, as well as the European Environment Agency (EEA), Eurostat, the Directorate-General on Climate Action of the European Commission (DG-CLIMA) and UNECE who provided secretariat support for the Task Force. The following experts participated on the Task Force: Robert Smith (Canada, Chair), Leo Kolttola (Finland, Vice Chair), Martin Adams (EEA), Enrique de Alba (Mexico), Julio Cabeca (Eurostat), Helen Champion (United Kingdom), Ricardo Fernandez (EEA), Angela Ferruzza (Italy), Julie Hass (Norway), Jesarela Lopez (Mexico), Tiina Luige (UNECE), John Mackintosh (United Kingdom), Michael Nagy (Qatar), Brian Newson (Eurostat), Rolando Ocampo (Mexico), Adriana Oropeza (Mexico), Anu Peltola (UNECE), Velina Pendolovska (DG-CLIMA), Giovanna Tagliacozzo (Italy), Stefano Tersigni (Italy) and Angelica Tudini (Italy).

15. The work is a step towards taking data needs related to climate change more fully into account in national statistical systems and improving the contribution of official statistics to analysing climate change related phenomena.

16. The United Nations Statistical Commission (UNSC) carried out a programme review on climate change and official statistics in 2009. The review was based on a paper by the Australian Bureau of Statistics and the outcome of two conferences on this topic held in 2008. As an outcome of the review, the UNSC recognised there is an important role for national statistical systems in filling data gaps related to climate change and emphasized the need for better understanding of the data requirements of stakeholders.

17. In view of these developments, the CES Bureau decided in 2011 to take stock of the current state of work on climate change related statistics in national statistical offices (NSOs) and asked UNECE to conduct a survey among member countries of the UNECE and the OECD. The survey was carried out with the support of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) and the United Nations Statistical Division (UNSD) in New York. The purpose was to find out the extent to which the NSOs are involved in producing climate change related statistics and to identify issues of common concern for further work at international level. The survey covered 69 countries reaching beyond the UNECE region. Of the 48 countries which replied, 37 reported involvement in work related to greenhouse gas inventories and 18 compiled other statistics related to climate change. The survey respondents called for international efforts to consider how the data available in national statistical systems could be made more useful for the purposes of climate change analysis and policy making. They also noted that analysis of climate change across all its dimensions would benefit from the linkage of climate change data, often produced outside of the national statistical system, with official statistics on the environment, society and economy. While the survey provided evidence that such linkages are already being made, it showed that there is clearly room for improvement.

18. Most national statistical offices reported currently providing data on economic activities to the compilers of greenhouse gas emission inventories. These so-called "activity data" include energy, industry, agriculture, forestry, transport, international trade, land use and land cover, wastewater and waste statistics. About one quarter of statistical offices also reported taking part somehow in the emissions calculations in addition to providing data.

19. To identify practical steps to support future development of climate change related statistics and enhance the role of official statistics in greenhouse gas inventories, the CES Bureau established the Task Force on Climate Change Related Statistics in November 2011 (terms of reference for the Task Force are provided in Annex 1). The Task Force was asked to start its work by assessing the gaps between user needs and available statistics and defining the scope of climate change related statistics. It was asked to collaborate with other bodies involved in related international work, including the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC), the European Commission's Directorate General for Climate Action (DG-CLIMA), Eurostat, the European Environmental Agency and the United Nations Statistics Division (UNSD). Regular progress reports were submitted by the Task Force to the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA).

20. The Task Force aimed to identify areas where improvements are most needed and where national statistical systems can best contribute with concrete actions. The Task Force paid special attention to recommendations related to making existing statistics more easily available to users and to identifying the highest priority statistical gaps that must be filled. Its work focused on six topics:

(a) Defining the scope of "climate change related statistics" and testing different frameworks and models for this purpose.

(b) Analysing user needs for climate change related statistics in both the policy and scientific domains to determine where the most pressing needs exist. This was done by conducting stakeholder interviews and by carrying out desk studies on the data needs for emission inventories and climate policies.

(c) Reviewing existing statistics of relevance to climate change and comparing those against the needs. The results of the survey of statistical offices was analysed to identify existing statistics and gaps.

(d) Analysing the relationships between NSOs and agencies responsible for greenhouse gas inventories to find opportunities for strengthening their cooperation.

(e) Reviewing the statistical infrastructure, such as standards, classifications and methods, used to report on climate change related statistics. The Task Force examined the existing infrastructure in NSOs in order to identify gaps and recommend priorities for improving this infrastructure.

(f) Identifying practical steps and priorities for future development of climate change related statistics so that they would better meet user needs.

21. The Task Force organized two expert meetings on climate change related statistics for producers and users. The first meeting was held on 19-20 November 2012 in Geneva. The meeting explored user needs for climate change related statistics and took stock of what statistical offices are doing in the area. It also discussed the definition of the scope of climate change related statistics. The conclusions of the meeting provided valuable input to the Task Force's work.

22. The Task Force organised a second meeting on 8-9 October 2013, again in Geneva, to discuss a draft version of the Task Force's report and its recommendations. The meeting brought various producers and users of climate change information together in order to t ke into account their views and expectations with regard to official statistics and climate change.

23. The Task Force was asked by the CES to prepare a report to review the current state of climate change related statistics and the possibilities to develop and streamline the work, with a proposal for:

(a) Developing climate change related statistics for evidence-based climate change policies: concrete steps and priorities for further work

(b) Harmonising and streamlining the work of NSOs on the greenhouse gas inventories.

24. This report presents the results of that effort. Section III provides the conclusions of Chapter 1 of the full report which discusses the definition and scope of climate change related statistics that the Task Force used in its work.

25. Section IV provides the conclusions of the Chapter 2 of the full report which focuses on the relationship between official statistics and GHG inventories. It discusses gaps between the needs of inventory compilers in ideal terms and what national statistical systems are currently able to provide are discussed.

26. Section V provides the conclusions of the Chapter 3 of the full report which focuses on climate change related statistics other than those required for GHG inventories. The section provides conclusions on user needs related to climate policies and climate change analysis, and existing statistics and gaps.

27. Section VI provides the conclusions of the Chapter 4 which addresses challenges of the statistical infrastructure of NSOs as coordinators of the development work to be done in the national statistical systems for climate change related statistics. National statistical systems are organised in different ways across countries. Therefore, the analysis is based on the most common roles, practices and data of national statistical systems in the UNECE countries.

28. The report concludes in with Section VII which equals Chapter 5 of the full report providing the Task Force's recommendations for the improvement of climate change related statistics. Practical examples and priorities for the implementation of these recommendations at the national and international levels are also considered.

III. Conclusions on the scope of climate change related statistics

29. The need to measure climate change has spurred the development of a wide variety of data. To identify how statistical systems could better respond to the need for climate change related statistics, it is first necessary to define the scope of such statistics. The Task Force devoted considerable discussion to this issue in particular, through the above examination of different frameworks and approaches used in the compilation of environmental statistics and also through evaluation of user needs. As a common feature to all frameworks and approaches examined, they suggest the need to measure the factors that are the cause of climate change, the consequences of climate on human and natural systems and the efforts of humans to avoid climate change and live with the consequences.

30. The conclusion of these discussions is that as climate change impacts the environment and society through complex interactions and cause-effect relations, the conceptually based definition of climate change related statistics would necessarily be wide and exhaustive. Climate change touches upon a broad range of human activities – from energy use to transportation, waste generation, agriculture, manufacturing and tourism etc. Indeed, few human activities are not related somehow to climate change, either as a contributing factor or via an impact. Climate change influences a wide range of natural phenomena: rainfall, temperatures, ocean and air currents and ecosystems that have an impact on human activities.

31. In the very broad sense, the Task Force defines the scope of climate change related statistics to include:

Environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to these consequences.

32. Whereas climate change is multi-disciplinary and anchored largely in the natural sciences, the statistical system is focused largely on anthropomorphic or human systems and provides data for administrative regions within national boundaries.

33. A broad definition is, therefore, only a starting point for statistical offices wishing to improve climate change related statistics. A pragmatic approach is needed to narrow the scope to those areas where the statistical system's involvement is most valuable. These are areas where the links between human and natural systems are most important in terms of understanding climate change – both from the point of view of its causes and its impacts. Evaluation of impacts requires interpretation and judgement in some cases. The focus of official statisticians is therefore on what can be measured in support of analysts' efforts to identify and assess the impacts of climate change. It is not the task of NSOs to assess the impacts but to provide the data for doing so.

34. To narrow the scope in the context of the statistical system, the Task Force decided to distinguish between climate change related statistics and climate change statistics in general. The latter would include data that measure climate and weather directly; for example, temperature and precipitation. These data are frequently, but not always, collected and analysed by agencies outside of the statistical system; for example, by meteorological organizations. The focus of the Task Force was on climate change related statistics. That is, environmental, social and economic statistics that measure climate change related:

(a) Emissions: GHG emissions and their human causes

(b) Drivers: human causes of climate change that deal with sources of emissions

(c) Impacts: impacts of climate change on human and natural systems

(d) Mitigation: efforts of humans to avoid the consequences

(e) Adaptation: efforts to adapt to these consequences

35. The first two groups, greenhouse gas emissions and drivers, describe causes of climate change. The latter three – impacts, mitigation and adaptation – describe the consequences of climate change. The first two groups, GHG emissions and their drivers, are discussed in Section IV while the others are discussed in Section V of this paper.

IV. Conclusions on greenhouse gas inventories and official statistics

36. The statistics that could be used as the basis of GHG inventories need to be examined to determine if the current statistics adequately cover the data needs of the main users namely, the inventory compilers, reviewers and analysts. Improving NSOs' contribution to inventory compilation could start by drafting, with the inventory compilers, a list of national priorities and a road map on country-specific data gaps and development needs for inventories. According to the analysis of user needs and existing NSO data, the key gaps from inventory compilers' viewpoint include knowledge of what data would be available from the statistical system and access to these data at the required level of disaggregation. From the inventory reviewers' viewpoint, the quality of some source data should be improved to match inventory data requirements. Often this refers to data on waste, energy, land use and forestry. From analysts' viewpoint, gaps exist especially in

timeliness of data, length of time series, access to disaggregation data and possibilities to link emissions with other statistics.

37. NSOs should be more aware of how the data of national statistical systems are or could be used for the compilation of greenhouse gas inventories. The Task Force has, therefore, provided a table following the example of the United Kingdom that NSOs can use to track which data could be sourced from the national statistical system (see Annex 4). Information on what data are needed would help NSOs to better organize their work and optimize the availability of data from national statistical systems for the purposes of emission inventories. NSOs should inform stakeholders about how the data of national statistical systems could be used for inventories and in relation with the inventory data.

38. The statistical system needs to be involved in discussions regarding data quality so they can focus on important improvements in the activity data. The IPCC regularly analyses the quality of the countries' inventories, and NSOs should look closely at the Inventory Review Reports to see if there are improvements needed in the basic statistics or the way they are used. The statistical data used to build the inventories should be considered part of the core of NSOs' work on climate change related statistics. NSOs can always initiate these quality improvements for the data falling within their mandate. NSOs could also have a wider role to play in the area of quality assurance of GHG inventories even in areas where their data are not used. This could, in fact, be a natural entry point to increased involvement by NSOs in GHG inventories. In the UNECE survey, the majority of NSOs thought it would be beneficial to discuss how NSOs could contribute to the UNFCCC Measurement, Reporting and Verification (MRV) approach to inventory compilation.

39. It is unlikely that the methodological or classification differences between GHG inventories and official statistics would be changed in the short term. Yet, they increase the workload as inventory compilers need to reclassify and recompile existing data, and in some cases similar data needs to be collected twice. Data consistency problems could be overcome by describing the differences between inventory data and official statistics, developing standardized tools such as correspondence tables, and explaining the differences by using reconciliation items. This would enable analysts to undertake integrated analysis of the economic, social and environmental aspects of GHG emissions. Emission inventories have especially important links with the system of national accounts, environmental accounting, air emissions and energy statistics.

40. NSOs could also work with inventory compilers to make activity data available at an earlier stage to help develop timelier emission estimates as opposed to the current 17-18 months' lag, or they could develop early estimates of GHG emissions using monthly and quarterly data sources that would not be comprehensive enough for actual GHG inventories. This would help more effectively inform climate change mitigation polices. Longer time series would also be needed for analysing drivers of emissions.

41. NSOs can also support the analysis of emission trends by providing background socio-economic data. Some examples of such data include population, fuel prices, GDP and gross value added (GVA) by branch/industry breakdown, national energy balances, and heating/cooling degree days. Furthermore, NSOs are well placed to contribute to analysing emissions by economic sectors, using energy statistics or developing accounts similar to air emissions for other sectors with relevance to climate change.

42. The overwhelming conclusion drawn from the evidence available to the Task Force is that there is a clear need for involvement of NSOs in emission inventory compilation. The benefits to the inventory process will be that this makes greater use of the knowledge NSOs have of the underlying datasets, whilst also benefiting from the high public trust afforded to NSOs as professionally independent producers of statistics. It would help

reduce parallel and sometimes duplicating reporting systems and unnecessarily high costs of data collection and respondent burden.

43. The existing data requirements under the UNFCCC and the Kyoto Protocol are well established already and significant changes are unlikely in the short term. NSOs should, therefore, adjust their work to existing guiding frameworks for GHG inventories. At the same time, NSOs should follow up on upcoming changes in data requirements, especially concerning activity data, energy statistics and energy balances. Experts from NSOs could help to evaluate whether the needed inventory source data are available or may be developed at reasonable cost. Methodological developments need to be based on what data are realistically available and not impose unreasonably high costs on inventory compilers, statistical systems or respondents.

V. Conclusions on climate change related statistics (other than greenhouse gas inventories)

44. Climate change related statistics comprise a very broad range of data that stretch across the entire statistical framework. Most official statistics are not collected specifically for climate analysis and, therefore, NSOs must better understand user needs in order to effectively direct their efforts in this domain. Data gaps must be identified together with the main users of climate change related statistics.

45. In general, the media and the public lack easy access to key climate change related statistics that are easy to understand. Policy makers' data needs are reflected in international climate accords, protocols and monitoring mechanisms. Their focus is shifting more and more towards analysis of the socio-economic impacts of climate change and to monitoring the effectiveness of adaptation and mitigation activities. The scientific community and analysts require access to detailed data, often microdata that has been geo-referenced.

46. Producers of climate change related statistics outside of the statistical system could help serve user needs if they had easier access to and better knowledge of official statistics. Statistical systems already produce a considerable quantity of data relevant for climate change. NSOs are well positioned to collect, coordinate, harmonize and disseminate climate change related statistics. A step-by-step approach should be adopted in facing this challenge: 1) facilitating access to the existing statistics; 2) improving the quality and usefulness of existing data from different domains; and 3) developing new statistics to fill priority data gaps.

47. Facilitating access to existing statistics means bringing together and disseminating existing data that are relevant for climate change analysis. Decision makers would benefit from having a portal of key climate change related statistics at their disposal. NSOs should lead the work of developing such portals. It is not necessary to physically bring together all data. Simply facilitating access to them would be a valuable contribution; for example, a meta-database of climate change related statistics found within and outside of the statistical system could be produced. NSOs provide quality assurance for official statistics, but they cannot certify the quality of official statistics produced outside the statistical system. This does not mean that NSOs should not facilitate access to all data relevant for climate change, but they can help promote improvements in the coherence and reliability of data produced by others.

48. Improving the usefulness of existing data for climate change analysis requires reviewing data collections and improving data linking across different statistics and producers' datasets. It entails a review of existing statistics and data collection systems to

see if they can be used to identify climate change related issues, such as relevant information on renewable energy sources, green jobs, new or recurrent diseases linked to climate change etc. In some cases small adjustments to data collections may improve the value of the collected data for climate change analysis notably, and they could lead to smarter use of the limited resources. NSOs' capacity in linking datasets produced by various organizations should also be strengthened. Data matching requires not only better technical capacity, but sufficient legislative environment for closer cooperation with other data producers and gradually a higher degree of data harmonization.

49. NSOs should determine what additional statistics might be needed in the longer term for climate change analysis. For example, NSOs should consider how to contribute to monitoring the impact of climate change on biodiversity and ecosystems. Reliable data on the use of economic instruments in mitigation efforts will be needed. Regular statistics should also be developed to monitor adaptation; including, resilience, risks and vulnerability of population groups and the preparedness to withstand the adverse impacts of climate change.

50. NSOs will need further guidelines on how to take into account the needs of climate change analysis in official statistics. For this, the links of the existing statistical frameworks to climate issues should be explored further. In the longer run, methodological guidelines for data collection and compilation on climate change related statistics should be developed.

51. A number of countries have developed national climate change adaptation strategies, based on various indicators sets to inform public environmental policies. Development of a set of key climate change related statistics should be internationally coordinated to achieve comparability across countries. In the longer term, high relevance areas for climate change related issues should be defined and provided as official statistics regularly.

VI. Conclusions on statistical infrastructure

52. For better collaboration, NSOs should have a contact person who would be in charge of coordinating GHG inventory source data issues, collaborating with the inventory compilers and keeping up with the outcomes of the UNFCCC conferences of the parties to better understand and prepare for the associated data requirements. Establishing a working group involving the inventory compiler and producers of official statistics that provide data for the inventories would be helpful.

53. Legislation has a crucial role in supporting production of emission inventories and cooperation among agencies. National legislation should facilitate effective cooperation between agencies belonging to the national emission inventory system and provide a legal basis for access to and exchange of data as required for the inventories.

54. The possibilities to improve the relationships between the concepts and classifications should be examined at the international level. For possibilities to build relationships with the UNFCCC, UNECE Protocol on the Pollutant Release and Transfer Registers (PRTRs), World Meteorological Organisation (WMO) and IPCC, NSOs would have to be represented by an international entity, such as the Conference of European Statisticians.

55. The Task Force acknowledged the need for capacity building especially, but not only, in countries who have not yet produced annual GHG inventories. There are currently no recognized good practices for NSO role in GHG inventory compilation as their role varies across countries and there is no forum for sharing experience on the topic. It would

be in the interest of both NSOs and inventory compilers to consider what these good practices would be.

56. Improvements in the current infrastructure of NSOs are required, such as balancing between detailed data needs and confidentiality; reviewing different statistical frameworks and standards; and in the longer term adjusting organizational structures to support production of cross-sectional statistics.

57. The High-level Group (HLG) for the Modernization of Statistical Processes and Services calls for flexibility of statistical organisations so that they would be agile to provide statistics according to user needs, at an acceptable cost. Cross-sectional statistics, such as climate change related statistics, may pose challenges to the structure and functioning of NSOs. Thus, producing climate change related statistics may be easier to undertake in an organization focused on serving the needs of different user categories and producing outputs by re-sorting and combining the collected data to match the user needs.

58. Statisticians will need to build new kinds of expertise for producing climate change related statistics. This includes building capacity to produce geo-referenced data; learning new methods of spatial statistics; improving the ability to match data from multiple sources; and building substantive knowledge in climate issues. More than anything else, closer networking with organizations involved in climate issues would be helpful.

59. The production of climate change related data lacks coordination. The users of climate data would benefit from better harmonization of concepts, classifications, methods and quality standards. NSOs role is to lead the way in the harmonization and standardization of statistical production and to ensure high-quality information produced, following common guidelines. Currently, such guidelines do not exist for most climate change related statistics other than GHG inventories. In some areas, the existing practices need to be promoted among the involved agencies.

VII. Recommendations

60. This section introduces the Task Force's recommendations for improving climate change related statistics and enhancing their support to greenhouse gas inventories. The recommendations are grouped as follows: 1) recommendations on the data needed for greenhouse gas inventories; 2) recommendations on other climate change related statistics; and 3) recommendations on statistical infrastructure required for this work. At the end of the section, the Task Force suggests an agenda for further work at international level.

61. The recommendations are based on the Task Force's own discussions and on the following:

(a) A UNECE survey of national statistical offices (48 countries replied) on their involvement in climate change related statistics and greenhouse gas inventories

(b) Stakeholder interviews with users of official statistics in matters related to climate change

(c) Discussion of the interim recommendations by the Bureau of the Conference of European Statisticians (CES) in February 2013 and the CES plenary session in June 2013, and a written consultation of the interim recommendations in June-July 2013 among CES members

(d) Feedback from two expert meetings: on 19-20 November 2012 to discuss the initial findings and to identify directions for future and on 8-9 October 2013 to review the draft recommendations.

62. In February 2013, the Bureau of the Conference of European Statisticians stressed the need for urgent action by statistical offices to fill gaps related to climate change. It is hoped, therefore, that the recommendations below will be discussed and acted upon as a priority by NSOs.

A. Recommendations related to supporting greenhouse gas inventories

63. The following recommendations suggest, first, working at the national statistical system to improve data for GHG inventories; second, collaborating at the wider national level with the inventory compilers; third, creating a dialogue at the international level between the "statistical" and the "climate" communities. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 1: NSOs must improve data and statistics required for GHG inventories; including, energy, industry, transport, agriculture, waste, forestry and land-use statistics. To harmonize and streamline their work on GHG inventories, NSOs may wish to consider the following issues and actions:

(a) NSOs should be more aware of how the data of national statistical systems are or could be used in GHG inventories to be able to take into account the related data needs. The national inventory reports submitted to the UNFCCC by GHG inventory compilers in each country and annual inventory review reports prepared by UNFCCC expert teams are important sources of information for NSOs to identify needs for data improvement.

(b) Currently, existing NSO statistics are not used to their full potential for emission inventories and some duplication of data collection exists between NSOs and other organizations. Increasing awareness of existing statistics is necessary to avoid this duplication of work. As the coordinator of the national statistical system, NSOs should promote better awareness of existing data in the national statistical system and how they can be used for GHG inventories. Official statistics should be the backbone of the inventories and additional data collection should be carried out only where official statistics cannot be used. NSOs, together with other agencies, need to ensure that inventory calculations use existing statistics as much as possible. This, in turn, would improve the quality of GHG estimates and consistency with other statistics.

(c) NSOs should take the initiative in improving quality of statistical data used for GHG inventories.

(i) Improving coherence of GHG inventories and official statistics where possible by: Clarifying the emission categories used in the UNFCCC Common Reporting Format (CRF) tables that are the basis for national inventory reports as compared to statistical classifications. Recompiling GHG emissions data from national inventory reports according to the International Standard Industrial Classification (ISIC/NACE) to bring them into closer line with other statistics. Adjustments are currently being made to the CRF categories that may bring them towards using a logic that is closer to ISIC. Developing standardized tools for comparison of official statistics and inventory data, such as correspondence tables. Explaining the differences between GHG inventories and official statistics by using reconciliation.

(ii) Given the importance of good quality energy balances to underpin GHG inventories, particular emphasis should be put on improving the quality of energy statistics and the related inventory data. Energy statisticians (whether in NSOs or other organizations) should aim to improve the quality of energy statistics and balances and to ensure the consistency of activity data used in GHG inventories with

the energy balances reported to international organizations (for example, to Eurostat and International Energy Agency (IEA)).

(iii) Several countries report the need to address data gaps or quality issues, especially on waste, agriculture, land use and forestry, the production of heat and electricity for own use and from renewable energy sources.

(iv) GHG inventory analysts would benefit from improved timeliness of activity data, including energy balances. Given the competence of NSOs in producing time series data, they could help develop longer time series for analysing the inventories; for example, data related to the drivers of emissions.

Recommendation 2: NSOs should be proactive in reaching out to national GHG inventory compilers and, ideally, they should be considered official institutions in the national systems of greenhouse gas inventories in all countries. The Kyoto Protocol provides the legal basis for the design of these national systems. Specifically, NSOs may wish to develop their role and involvement in GHG inventory compilation along the following lines.

(a) Considering that NSOs provide a considerable portion of the statistics required for GHG inventories, NSOs should have a clear role in providing statistics, assisting in calculations as needed and with quality assurance. This should be established through official agreements; for example, by including NSOs in the national systems responsible for GHG inventories. This could be done simply by explicitly noting the role of the NSO in the inventory documentation submitted to the UNFCCC or more formally via a Memorandum of Understanding between the NSO and the national entity responsible for the inventory. This would provide certainty about the roles and responsibilities of each institution and closer co-operation would help improve the quality of GHG inventories.

(b) Facilitating the collaboration of the national inventory compilers with the statistical system would be part of the NSOs' role as the coordinator of the national statistical system. Therefore, NSOs should be aware of the data needs of and be actively engaged in the national inventory system.

(c) Working with inventory compilers to identify and evaluate statistics needed for emission inventories would help see if the statistics are fit-for-purpose. This work could be started by drafting, together with the inventory compilers, a prioritized list of national data gaps and a road map on data development to improve official statistics for GHG inventories. Development of NSOs' statistics should be prioritized based on where effective changes can be made in each country.

(d) It may be beneficial to create a national working group consisting of the NSO, inventory compilers and other relevant organisations belonging to the national statistical system. The objective would be to share information, review existing statistics, identify overlaps and areas for synergies and discuss challenges. The longer term goal would be to reduce costs, avoid duplicate data reporting, improve consistency and move towards multipurpose data systems serving various user needs.

(e) The experience of NSOs in quality assurance would be useful in supporting the efforts at strengthening the quality of GHG inventory. The European Statistics Code of Practice and the UN Fundamental Principles of Official Statistics form a clear institutional context for compiling objective and impartial statistical information that could be applied to GHG inventories. NSOs could use the approach of data confrontation to compare inventory results with other statistics to reveal unexpected results in the inventories. Such an approach is often useful in revealing errors.

Recommendation 3: The international statistical community should take an active role in contributing to the global GHG inventory system. The standards, classifications and methods of greenhouse gas inventories and official statistics are developed and agreed upon in international processes. Therefore, a better dialogue among international organisations, including international statistical organizations, working on climate issues would be beneficial. The international statistical community and the NSOs may wish to consider the following issues and actions:

(a) Seeking closer collaboration between international statistical organizations (for example, the UNECE Conference of European Statisticians and its Secretariat and the UN Statistics Division) and UNFCCC, IPCC, UNECE Protocol on PRTRs, WMO, International Renewable Energy Agency (IRENA), International Institute for Applied Systems Analysis (IIASA) and others. Better interaction at this level could help, for example, to ensure that inventory method development takes into account the availability of data and to avoid development of methods that require data that are not generally available in most countries.

(b) Following up on the outcomes of the UNFCCC conferences of the parties to the convention. This would help reduce the costs of the global system and improve the quality of inventories. The statistical community can add value by assessing data availability and feasibility of requirements related to the Kyoto Protocol, and by preparing themselves for possible new data requirements.

(c) The 17th UNFCCC Conference of the Parties in Durban launched a new negotiation (the Durban Platform) that foresees a single new international agreement beyond 2020 that would bring all major emitters, developed and developing, under the same legal framework. Involving NSOs from the beginning in countries that will enter this framework over the coming years could help to avoid creating overlapping data reporting systems.

(d) Actively collaborating with UNFCCC review teams to engage more effectively with UNFCCC, UNECE Protocol on PRTRs and the IPCC work. This collaboration would offer insight into how official statistics could be better used in GHG inventories.

(e) The existing international network of NSOs could also help exchange experience on NSO's contribution to the quality of GHG inventories; for example, through expert meetings, newsletters and other communications tools.

B. Recommendations on climate change related statistics (other than greenhouse gas inventories)

64. The following recommendations suggest, first, facilitating access to data that already exists; second improving the existing data for climate change analysis; and after that developing new statistics based on a review of key data needs in each country. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 4: NSOs must improve the contribution of official statistics to climate change analysis. One of the first steps should be facilitating access to existing statistics within the national statistical system. To do this, NSOs may wish to consider the following issues and actions:

(a) Creating national forums for discussions between producers and users of climate change related statistics; for example the meteorological agencies and the scientific community. These discussions would help NSOs identify their most relevant existing statistics and most urgent needs for new statistics.

(b) Promoting the use of the existing official statistics for the purposes of climate change analysis. If stakeholders have knowledge of existing data, duplication of data collection activities will be avoided.

(c) Using NSOs' dissemination channels to provide access to climate change related statistics. This may include also data not produced by the NSO (for example, scientific data). At the moment, statistics needed for understanding the causes and consequences of climate change are scattered across various organizations. Creating a "portal" for climate change related statistics as part of NSOs' dissemination channels would make them more accessible and easier to use. The portal would be an entry point to data and metadata on a wide range of existing data and statistics with relevance to climate change. This would require cooperation with scientific organizations. Meteorological services, for example, have long time series of data on climatic variables (temperature, precipitation, etc.) that could be provided with the data of national statistical systems.

(d) Considering new approaches to preserving confidentiality of respondents' data to improve access to microdata for policy makers and scientists working on climate change.

Recommendation 5: The usefulness of existing environmental, social and economic statistics for climate change analysis should be improved; for example by better structuring them. To do this, NSOs may wish to consider the following issues and actions:

(a) Reviewing statistical programs and data collections from the view point of the data needs of climate change analysis; for example to see if they provide suitably detailed statistics on renewable energy, green jobs, food production, water use, health and diseases, tourism, population and population growth, among other things. In some cases, simple adjustments to data collections may improve the value of statistics for climate change analysis, leading to more efficient use of limited resources. Users could be invited to help guide these reviews to identify key needs for improvements.

(b) Addressing the difficulties in matching data from different statistical domains and the lack of coherence among data sets. NSOs should put emphasis in improving linking between socio-economic data sets and environmental data sets by means of increased methodological and operational harmonization.

(c) Geo-referencing all relevant data to support analysis of the spatial dimension of data linked to climate change. This would also improve linkage of existing data with climate change and other environmental data. A good example is the support provided by NSOs in Europe for the INSPIRE programme.

(d) Producing statistics for new geographical areas, such as coastal areas or areas prone to flooding or drought. More statistics related to urban areas and other small regions are needed especially in developing countries. Often survey samples do not provide sufficient coverage to compile small-area statistics. In some cases, it may be possible to obtain useful data from administrative sources that cover populations at a finer level of resolution than is possible with sample surveys.

Recommendation 6: NSOs should consider development of new statistics based on a review of the key data needs of climate change policy makers and analysts in their country. When considering the production of new statistics, it is important to recall the key competencies of NSOs and take into consideration the traditional boundaries of their work; for instance, NSOs do not usually compile forecasts or make judgements about cause-effect relationships. Based on the analysis presented in Chapter 3 of the full report, the key data gaps to consider include among others:

(a) Analysing drivers of climate change by considering new efforts to connect economic information to climate change related issues by developing or expanding environmental accounts that allow, for example, GHG emissions and water use to be linked with economic activities. This would facilitate multi-sectoral analyses of the drivers of climate change. The System of Environmental Economic Accounting Central Framework's (SEEA-CF) guidance should be followed in constructing such accounts. Implementing the SEEA-CF to support measurement of climate change related issues should be seen as an important strategic goal for NSOs. International statistical organisations should consider how to best support countries in the use of the SEEA-CF for the measurement of climate change related issues.

(b) Developing statistics on the use of economic instruments in climate change mitigation efforts for analysing the effectiveness of new instruments (for example carbon taxes, tradable emission permits, subsidies). The measurement of financial flows associated with the use of these instruments and the inclusion of these flows in a clear, consistent and observable fashion in government finance statistics and national accounts needs to be addressed.

(c) Developing statistics to address climate change adaptation and adaptive capacity; for example statistics measuring resilience, risks and vulnerability of population groups and societal preparedness to withstand the adverse impacts of climate change. Relevant measures include populations at the risk of natural disasters or at the risk of poverty due to climate change.

(d) Considering how to contribute to the on-going efforts to monitor biodiversity and ecosystems. Climate change is one among a range of human factors affecting ecosystems and the related goods and services. Establishing baseline estimates of ecosystems today will make the assessment of the impacts of climate change more robust. As this work falls quite far from NSOs' normal area of work, this will require cooperation with environmental protection agencies and other organizations responsible for ensuring ecosystem quality.

C. Recommendations on statistical infrastructure

65. The following recommendations suggest, first, reviewing the current statistical infrastructure to see how the needs of climate change analysis are met; second, acquiring some new capacity, knowledge, skills and partnerships; and third considering how the current organisation of work in each country supports producing climate change related statistics. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 7: Existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to climate change analysis are appropriately addressed. Furthermore, the legislative environment for producing climate change related statistics and supporting the compilation of GHG inventories may need to be assessed. The following issues and actions may be considered by NSOs:

(a) Giving consideration in future revisions of international statistical standards and classifications to the data needs of climate change analysis; for instance, by introducing changes in the System of National Accounts to improve statistics on emission trading systems following the guidelines of the IPCC/UNFCCC. The relevant classifications to be reviewed include e.g. those relating to industries (ISIC), education (ISCED), employment (ICSE), trade (SITC) and products (CPC). If these classifications allowed for climate change related statistics to be more easily identified, NSOs could more readily extract and compile new statistics from existing statistical data. Improved classifications might, for

example, enable extraction of data on climate-related education, research, jobs, "low-carbon" industries, "green" technologies, biotechnology products, and international trade flows.

(b) Identifying and addressing the obstacles to linking statistics across domains – in particular, environmental and energy statistics – both with each other and with the national accounts. Examples include reviewing differences in the concept of "energy" across statistical domains, ensuring data consistency across institutions and testing the use of supply-use and input-output data for linking industrial production to energy use and air emissions.

(c) Considering new approaches to preserving confidentiality of respondents' data while providing access to microdata for policy makers and scientists working on climate change. Protection of confidential data is assured by statistical laws in most countries and is an important prerequisite for the production of reliable official statistics. Any solutions sought must, therefore, be in line with existing legal frameworks. An approach used in some countries is to assign those elements of the GHG inventory compilation process that require the use of confidential data to the NSO. New technological solutions may be needed for providing access to more detailed data without compromising data confidentiality. This could include the use of search engine type of tools which allow making queries to microdata through the website, such as the Demographic Explorer for Climate Adaptation (DECA) tool presented in section 3.1 of the full report.

(d) Considering the inclusion of explicit references to environmental statistics, including climate change related statistics, in statistical laws when there are opportunities to revise them. NSOs may not be provided with financial resources for developing climate change related statistics without an explicit legal mandate.

Recommendation 8: Statisticians will gradually require new partnerships, expertise and ability to adopt new methodologies for producing climate change related statistics. To strengthen the available knowledge, NSOs may wish to consider the following issues and actions:

(a) Building knowledge and understanding of the natural sciences among NSO staff who, traditionally, have been professional statisticians specialized in economic and social topics. This can be achieved, largely, by partnering and collaboration with other agencies and experts, and in part, by looking beyond traditional disciplines when recruiting staff. Staff with such knowledge will be better able to communicate with experts involved in the IPCC/UNFCCC regarding, for example, the kinds of activity data that NSOs realistically can and cannot provide. It should be recognized, however, that some of the areas of GHG inventories (for example, land use) and climate change related statistics require specialized expertise that would not be sensible for NSOs to acquire. In those instances, the focus should be on acquiring the required expertise through partnering.

(b) Familiarizing staff with GHG inventory methodologies and their evolution to increase synergies between inventory compilers and official statisticians. NSO staff should, for example, understand the logic of the CRF tables and the IPCC methodologies and guidelines, as well as review the issues raised in the Inventory Review Reports regarding source data for the inventories.

(c) Developing knowledge, methodologies and tools for producing and using geo-referenced data across the statistical system.

(d) Ensuring the effective transfer of knowledge and skills among NSOs internationally. Tackling the challenges of climate change will require good quality, comparable data across a wide range of countries. A basic level of knowledge and skills in this domain will, therefore, be required in all countries.

Recommendation 9: In the longer run, organizational changes may be needed in NSOs, the national statistical system and the national system for greenhouse gas inventories to support the production of climate change related statistics. In this regard, NSOs may wish to consider the following issues and actions:

(a) Assigning, as a first step, a person or group with the primary responsibility for ensuring the quality and availability of climate change related statistics, including statistical data for GHG inventories, and establishing contacts with key users and producers of climate information.

(b) Modifying, in the longer term, the organizational structure of NSOs or the national statistical systems to support production of climate change related statistics that cut across the statistical system. According to the High-level Group for the Modernization of Statistical Processes and Services, "the challenge for statistical organizations is to be sufficiently flexible and agile to provide statistics according to user needs, at an acceptable cost." They note that crosscutting data are necessary but may pose challenges to the existing structures and functioning of NSOs.

(c) As suggested above, especially in the context of GHG inventories, changes and clarifications may be needed in the division of work and responsibilities between the different producers of climate change related data and GHG inventories.

(d) Earmarking sufficient resources for the development of environmental statistics and climate change related statistics. The modernization of statistical processes that many NSOs are targeting currently may liberate financial and human resources that could be used to meet new needs related to climate change.

D. Next steps and unresolved issues

66. The recommendations above are the first that have been developed to help NSOs improve climate change related statistics and enhance their support to the compilation of GHG inventories. They cannot, therefore, be taken to be the final word on this topic and NSOs can be expected to require further guidance to help them take account of the needs of climate change analysis and GHG inventories.

67. The Task Force suggests that guidance be provided to countries that wish to move forward in the implementation of these initial recommendations. Therefore, it is suggested that a small steering group, comprising 6-8 countries and international organizations, be established to provide on-going direction to countries wishing to move forward.

68. A longer term goal should be to define a set of key climate change related statistics. Several countries are currently developing climate change indicator sets for policy purposes. This work should be internationally coordinated to enable availability of comparable statistics across countries.

69. One of the key conclusions of the Task Force work has been the need for better dialogue between NSOs and those involved in climate change policy and analysis. During the course of its work, the Task Force established good contacts and working relationships with the IPCC, UNFCCC, UNECE Protocol on PRTRs and WMO. The members of the statistical system need to continue engaging with these organisations to further define and establish the role of NSOs and other members of the system in support of climate change policy and analysis. For this to happen, NSOs, GHG inventory compilers and relevant international organizations must continue to share ideas, good practices and areas for collaboration.

70. Therefore, the Task Force suggests establishing an international forum for discussions among the producers and users of climate change related statistics with the

participation of IPCC, UNFCCC UNECE Protocol on PRTRs and WMO as a logical next step. These partners have expressed support for forming such a forum. The forum could identify specific areas of climate change related statistics that require further methodological work. These, in turn, could be addressed by setting up focused task forces to help countries tackle the related methodological work. The Forum should be country driven and designed to facilitate:

(a) Sharing development ideas and experience, as well as good practices in climate change related statistics.

(b) Discussing collaboration, roles and division of responsibilities among the statistical community, greenhouse gas inventory compilers and the relevant international organisations.

(c) Exploring the priority data needs in climate change related statistics to enable selection of a key set of climate change related statistics.

(d) Discussing concepts and measurement frameworks to be developed for the key climate change related statistics.

(e) Identifying areas where practical methodological guidance would need to be developed for NSOs.

71. There are many unresolved issues that should be considered in order to develop climate change related statistics further. Below is a sample of some of the unresolved issues to be discussed as part of future international work on climate change related statistics:

(a) What statistics should be disseminated in climate change portals and in what level of detail?

(b) How to ensure coherence of GHG inventory data with official statistics (energy, environmental accounts, and national accounts)?

(c) How best to use SEEA-CF for the measurement of climate change related statistics?

(d) How to update existing statistical standards or classifications to better serve climate change data needs?

72. An important challenge will be to find the balance between country-specific development work and setting standards to improve quality and comparability of climate change related statistics internationally. Both will be needed – methodologies cannot be developed without country experience and research – but standards must be developed before diversified statistical practices are in place.